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Yamamoto et al.

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(54) **VEHICLE LAMP**

(71) Applicant: **KOITO MANUFACTURING CO., LTD.**, Tokyo (JP)

(72) Inventors: **Ippei Yamamoto**, Shizuoka (JP); **Masahito Naganawa**, Shizuoka (JP)

(73) Assignee: **KOITO MANUFACTURING CO., LTD.**, Tokyo (JP)

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(51) **Int. Cl.**

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F21S 41/147	(2018.01)
F21S 41/32	(2018.01)
F21S 41/663	(2018.01)

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CPC ***F21S 41/36*** (2018.01); ***F21S 41/147*** (2018.01); ***F21S 41/321*** (2018.01); ***F21S 41/663*** (2018.01)

(58) **Field of Classification Search**

CPC F21S 48/1159; F21S 48/1323; F21S 48/1388; F21S 48/1747; F21S 48/1352; F21S 48/1358; F21S 48/1364; F21S 48/137; F21S 48/1376

USPC 362/464, 465, 507, 509, 513, 539, 543, 362/544, 516–518

See application file for complete search history.

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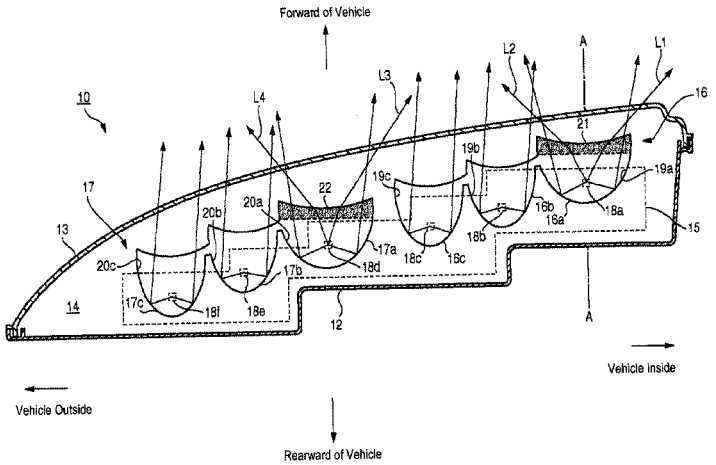
Primary Examiner — Tsion Tumebo

(74) *Attorney, Agent, or Firm* — Sughrue Mion, PLLC

(57) **ABSTRACT**

A vehicle lamp **10** includes a first parabolic high-beam condensing reflector **16***b*, a second parabolic high-beam condensing reflector **17***c* and a parabolic high-beam diffusing reflector **16***a*. The first and second parabolic high-beam condensing reflectors **16***b*, **16***c* forms a high-beam condensed light distribution pattern by reflecting light emitted from light sources **18***b*, **18***c*. The high-beam diffusing reflector **16***a* forms a high-beam diffused light distribution pattern by reflecting light emitted from a light source **18***a*. A part **21** of a reflection surface of the high-beam diffusing reflector **16***a* is located in front of front end portions of the first and second parabolic condensing reflectors **16***b*, **16***c*.

7 Claims, 5 Drawing Sheets



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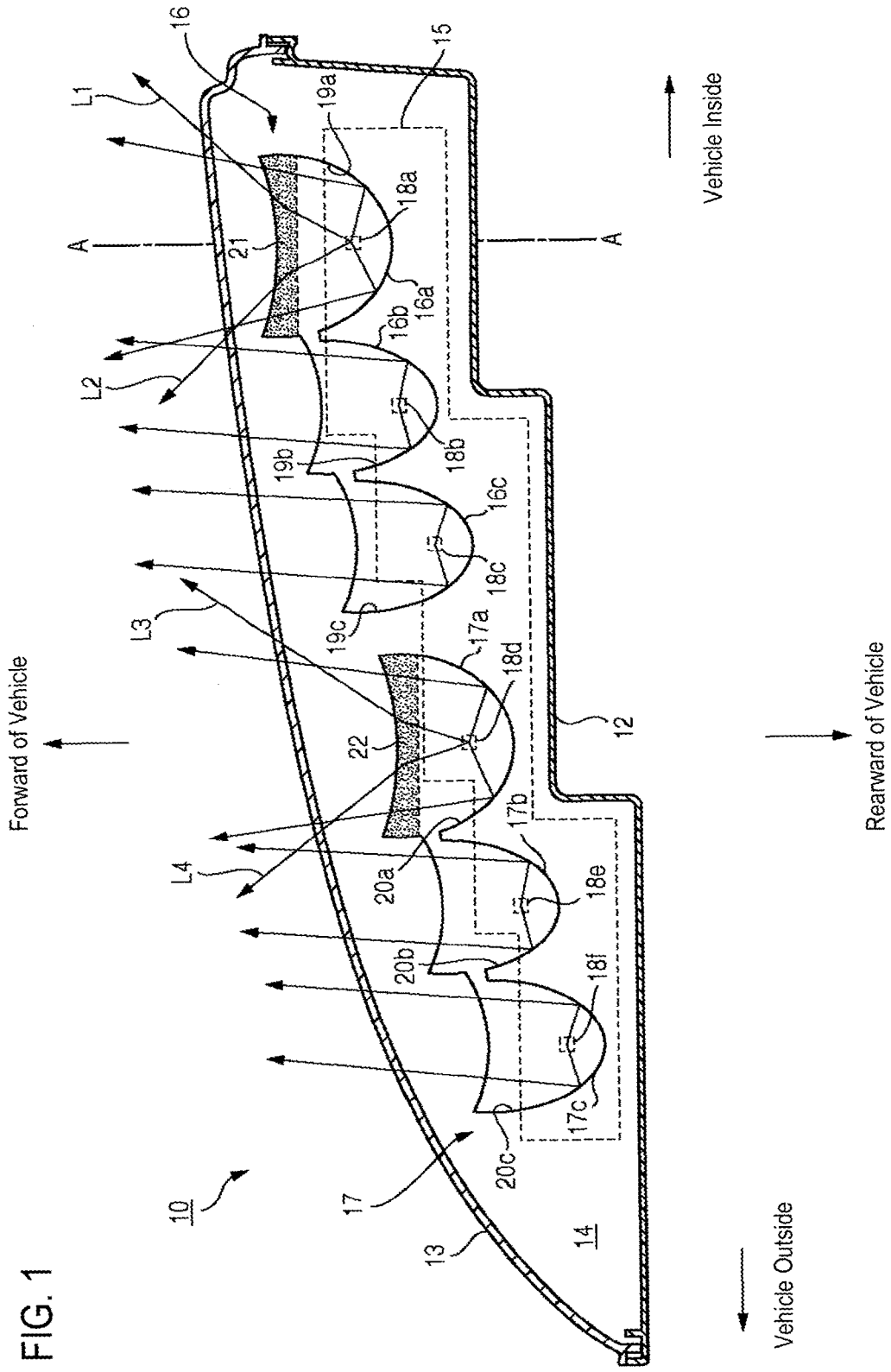

16
15
L1
19a
18a
A
21
A
Vehicle Inside
16b
16a
L2
18b
19b
16c
18c
L3
19c
17a
18d
Forward of Vehicle
22
12
Rearward of Vehicle
17b
L4
20a
18e
20b
18f
17c
20c
10
17
13
14
Vehicle Outside

FIG. 1

FIG. 2

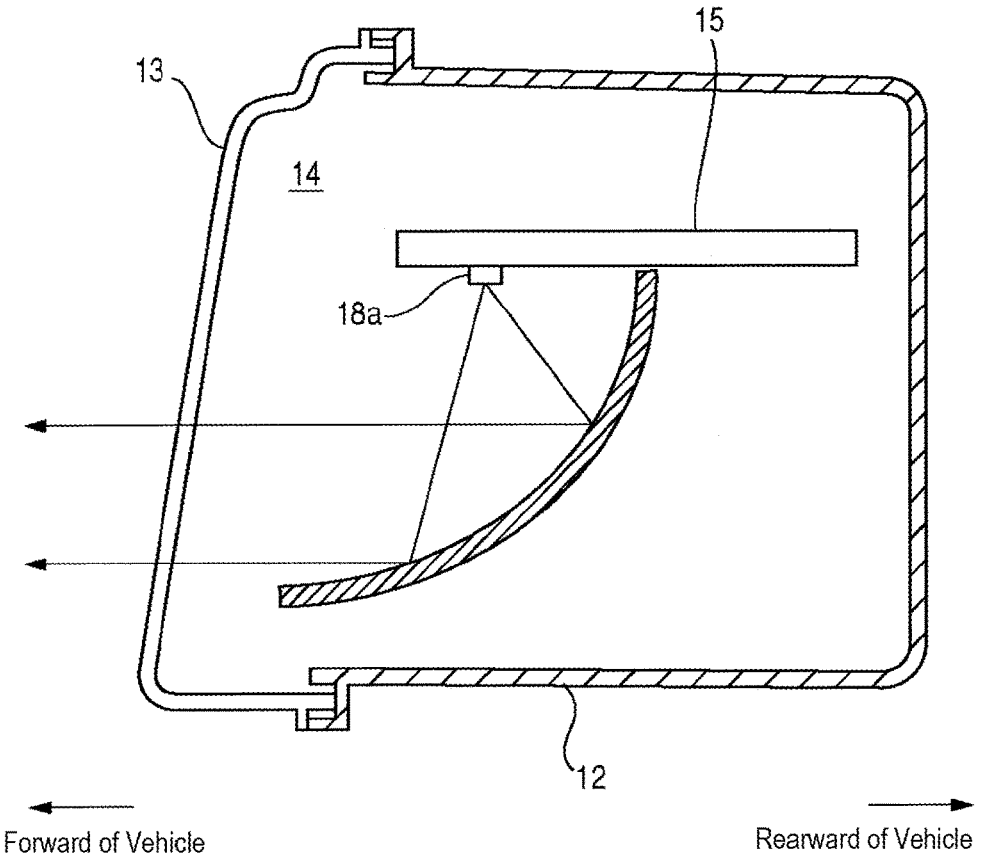

15
13
14
18a
12
Forward of Vehicle
Rearward of Vehicle

FIG. 3

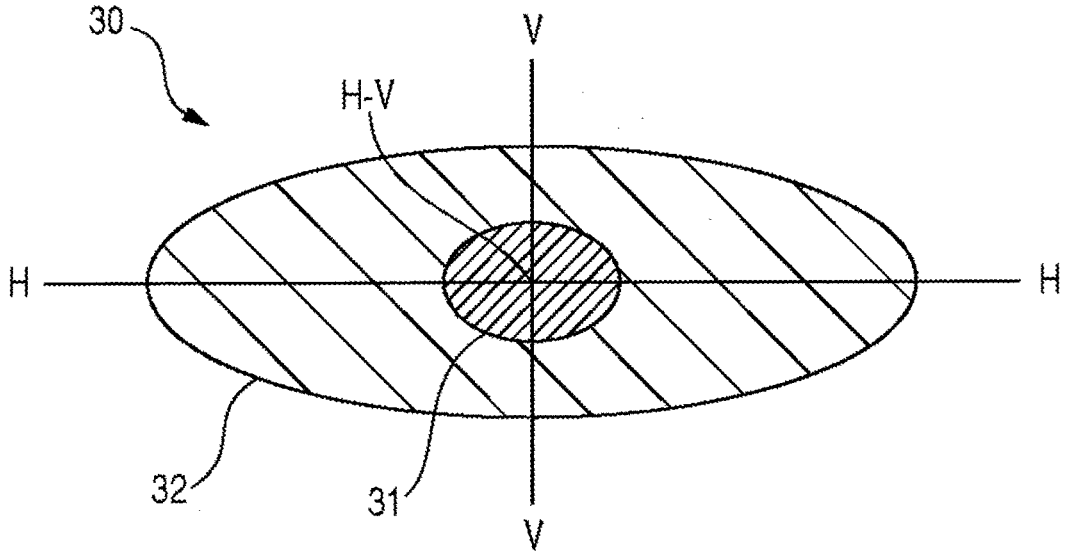
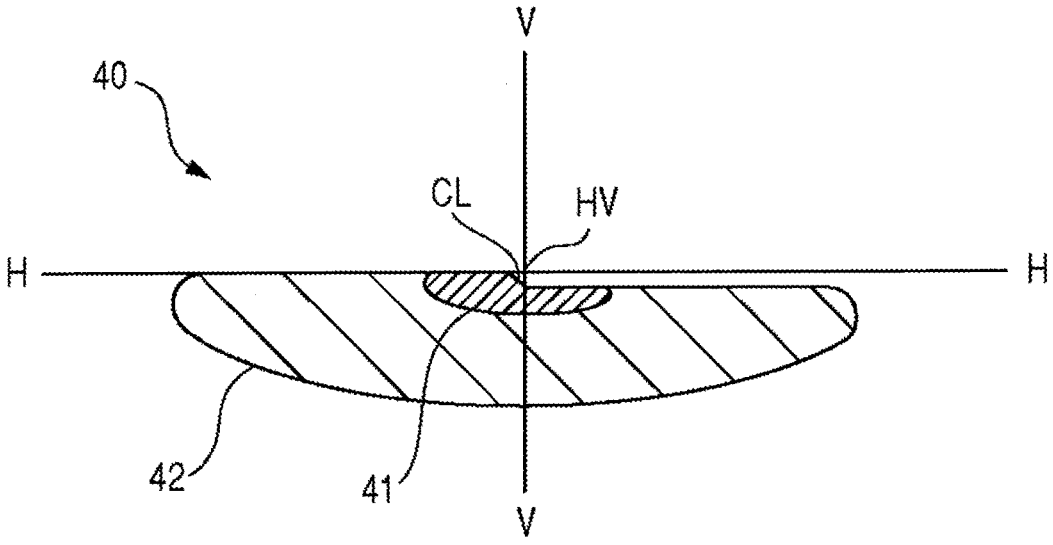

30
V
H-V
H
H
32
31
V

FIG. 4



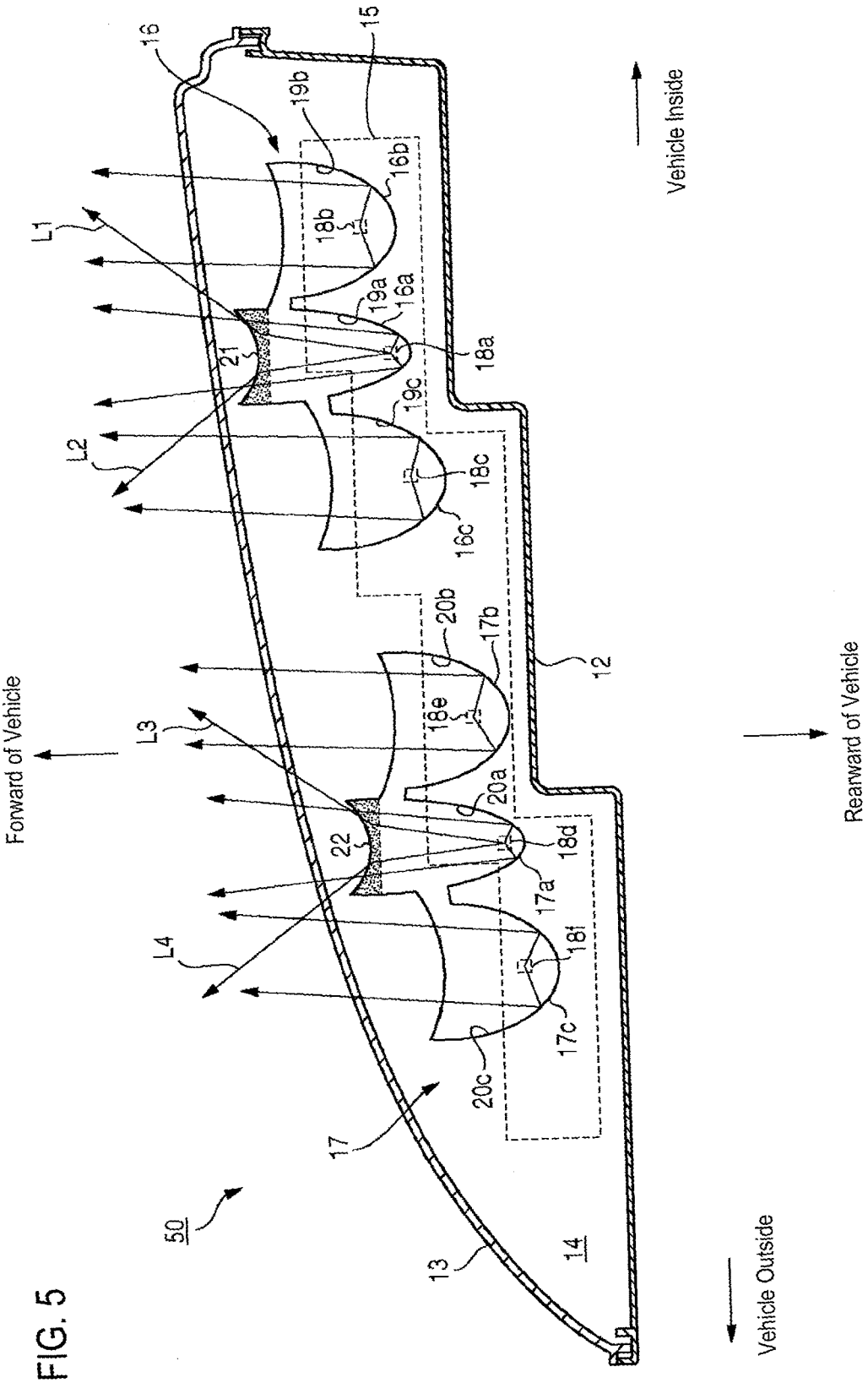

Forward of Vehicle
Rearward of Vehicle
Vehicle Inside
Vehicle Outside
L1
L2
L3
L4
50
12
13
14
15
16
16a
16b
16c
17
17a
17b
17c
18a
18b
18c
18d
18e
18f
19a
19b
19c
20a
20b
20c
21
22

FIG. 5

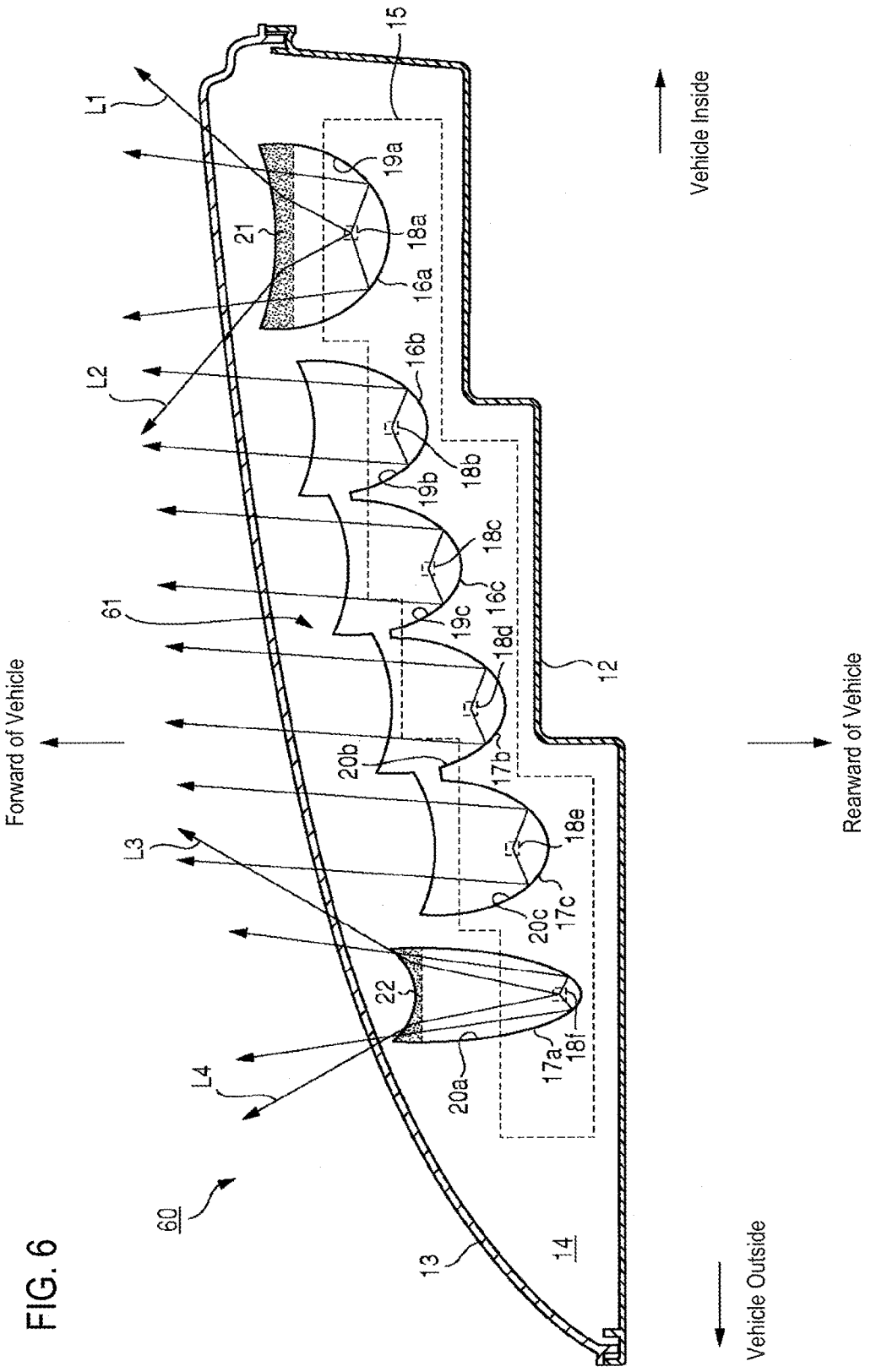

15
L1
19a
18a
21
16a
16b
L2
18b
19b
18c
16c
19c
18d
61
12
Forward of Vehicle
Rearward of Vehicle
Vehicle Inside
Vehicle Outside
20b
17b
18e
L3
20c
17c
22
L4
18f
17a
20a
60
13
14

FIG. 6

VEHICLE LAMP

CROSS REFERENCE TO RELATED APPLICATION(S)

This application is based on and claims priority under 35 U.S.C. § 119 to Japanese Patent Application No 2013-163318 (filed on Aug. 6, 2013), the entire contents of which are incorporated herein by reference.

BACKGROUND

Technical Field

Exemplary embodiments of the invention relate to a vehicle lamp, and more particularly relate to a vehicle lamp in which a light emitting element such as an LED and a parabolic reflector are used.

Related Art

JP 2011-81975 A, for example, describes a vehicle lamp including a plurality of LEDs and a plurality of reflectors each of which reflects a light beam emitted from the corresponding LED.

SUMMARY

In general, to form a predetermined light distribution pattern using a plurality of reflectors, a part of the reflectors is formed so as to illuminate a light condensed region (which may be called a hot zone) in the light distribution pattern and the other reflectors are formed so as to illuminate a diffused region around the light condensed region.

However, where the reflectors for the light condensed region and those for the diffused region have certain positional relationships, a part of the light reflected by the reflector(s) for the diffused region may be shielded by the reflector(s) for the light condensed region to lower the visibility of side portions of an illumination area ahead of a vehicle (which may be referred to as an "illumination area ahead").

Exemplary embodiments of the invention have been made in view of the above circumstances, and provide a vehicle lamp which can increase the visibility of side portions of an illumination area ahead.

(1) According to one exemplary embodiment of the invention, a vehicle lamp includes a first parabolic condensing reflector and a parabolic diffusing reflector. The first parabolic condensing reflector forms a condensed light distribution pattern by reflecting light emitted from a first light source. The parabolic diffusing reflector forms a diffused light distribution pattern by reflecting light emitted from a second light source. At least a part of a reflection surface of the diffusing reflector is located in front of a front end portion of the first parabolic condensing reflector.

(2) In the vehicle lamp of (1), the diffusing reflector may be located on a vehicle inside of the first parabolic condensing reflector.

(3) In the vehicle lamp of any one of (1) to (2), an F value of the reflection surface of the diffusing reflector may be smaller than that of a reflection surface of the first parabolic condensing reflector.

(4) The vehicle lamp of any one of (1) to (3) may further include a second parabolic condensing reflector that forms a low-beam condensed light distribution pattern. The condensed light distribution pattern formed by the first parabolic condensing reflector may be a high-beam condensed light distribution pattern. The first parabolic condensing reflector and the second parabolic condensing reflector may be integrated together.

(5) In the vehicle lamp of any one of (1) to (4), the first light source and the second light source may be mounted on a common board that extends in a horizontal direction.

One exemplary embodiment of the invention can provide a vehicle lamp which can increase the visibility of side portions of an illumination area ahead.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic horizontal section view of a vehicle lamp according to a first embodiment of the invention;

FIG. **2** is a section view of the vehicle lamp taken along a line A-A in FIG. **1**;

FIG. **3** shows a high-beam light distribution pattern which is formed by a high-beam lamp unit;

FIG. **4** shows a low-beam light distribution pattern which is formed by a low-beam lamp unit;

FIG. **5** is a schematic horizontal section view of a vehicle lamp according to a second embodiment of the invention; and

FIG. **6** is a schematic horizontal section view of a vehicle lamp according to a third embodiment of the invention.

DETAILED DESCRIPTION

Vehicle lamps according to exemplary embodiments of the invention will be hereinafter described in detail with reference to the accompanying drawings. In this specification, when direction-indicative terms such as "top," "bottom," "front," "rear," "left," "right," "inside," and "outside" are used, these terms mean directions in a state where the vehicle lamp is mounted in a predetermined posture in a vehicle.

FIG. **1** is a schematic horizontal section view of a vehicle lamp **10** according to a first embodiment of the invention. FIG. **2** is a section view of the vehicle lamp **10** taken along a line A-A in FIG. **1**. The vehicle lamp **10** shown in FIG. **1** is one of two (left and right) headlamps provided in a front portion of a vehicle. Since these headlamps are substantially the same in structure, the structure of the left-hand vehicle lamp **10** will be described below representatively.

As shown in FIGS. **1** and **2**, the vehicle lamp **10** includes a lamp body **12** and a transparent outer cover **13** which covers a front opening of the lamp body **12**. A lamp chamber **14** is formed by the lamp body **12** and the outer cover **13**. As shown in FIG. **1**, the outer cover **13** has a shape that conforms to a slant nose shape of the vehicle and is thus inclined rearward from the vehicle inside toward the vehicle outside. Conforming to the shape of the thus-inclined shape of the outer cover **13**, the lamp body **12** has a step-like shape so as to come closer to the rear side of the vehicle from the vehicle inside toward the vehicle outside. Therefore, the lamp chamber **14**, which is formed by the lamp body **12** and the outer cover **13**, is a space that is inclined rearward from the vehicle inside toward the vehicle outside.

A board **15**, a high-beam reflector unit **16**, and a low-beam reflector unit **17** are housed in the lamp chamber **14**. The board **15**, the high-beam reflector unit **16**, and the low-beam reflector unit **17** are fixed to the lamp body **12** by respective support members (not shown).

The board **15** is disposed in an upper portion of the lamp chamber **14** and extends horizontally from the vehicle inside toward the vehicle outside. As shown in FIG. **1**, conforming

to the slanted shape of the outer cover **13**, the board **15** has a step-like shape so as to come closer to the rear side of the vehicle from the vehicle inside to the vehicle outside.

Six LEDs (first to sixth LEDs **18***a* to **18***f*) are mounted on the board **15** with their light emitting surfaces down. The first to sixth LEDs **18***a* to **18***f* are supplied with currents from the board **15** to emit light.

The first to third LEDs **18***a* to **18***c* are LEDs for high-beam illumination and are disposed on the vehicle inside of a center of the board **15**. Among these three LEDs **18***a* to **18***c*, the first LED **18***a* is located vehicle-innermost (rightmost in FIG. **1**). The second LED **18***b* is located on the vehicle outside of the first LED **18***a* (in FIG. **1**, on the left side of the first LED **18***a*). The third LED **18***c* is located on the vehicle outside of the second LED **18***b*.

The fourth to six LEDs **18***d* to **18***f* are LEDs for low-beam illumination and are disposed on the vehicle outside of the center of the board **15**. Among these three LEDs **18***d* to **18***f*, the fourth LED **18***d* is located vehicle-innermost. The fifth LED **18***e* is located on the vehicle outside of the fourth LED **18***d*. The sixth LED **18***f* is located on the vehicle outside of the fifth LED **18***e*.

The high-beam reflector unit **16** and the low-beam reflector unit **17** are disposed side by side below the board **15** in the lamp chamber **14**. The high-beam reflector unit **16** is located on the vehicle inside of the low-beam reflector unit **17**.

The high-beam reflector unit **16** is a reflector group for high-beam illumination and includes three parabolic reflectors, that is, a high-beam diffusing reflector **16***a*, a first high-beam condensing reflector **16***b*, and a second high-beam condensing reflector **16***c*. The three reflectors **16***a* to **16***c* are integrated together. Among the three reflectors **16***a* to **16***c*, the high-beam diffusing reflector **16***a* is located vehicle-innermost. The first high-beam condensing reflector **16***b* is located on the vehicle outside of the high-beam diffusing reflector **16***a*. The second high-beam condensing reflector **16***c* is located on the vehicle outside of the first high-beam condensing reflector **16***b*.

The high-beam diffusing reflector **16***a*, the first high-beam condensing reflector **16***b*, and the second high-beam condensing reflector **16***c* have respective reflection surfaces **19***a* to **19***c* each of which is formed with a paraboloid of revolution as a reference. The first LED **18***a* is disposed at a focal position of the reflection surface **19***a* of the high-beam diffusing reflector **16***a*. The second LED **18***b* is disposed at a focal position of the reflection surface **19***b* of the first high-beam condensing reflector **16***b*. The third LED **18***c* is disposed at a focal position of the reflection surface **19***c* of the second high-beam condensing reflector **16***c*.

The low-beam reflector unit **17** is a reflector group for low-beam illumination and includes three parabolic reflectors, that is, a low-beam diffusing reflector **17***a*, a first low-beam condensing reflector **17***b*, and a second low-beam condensing reflector **17***c*. The three reflectors **17***a* to **17***c* are integrated together. Among the three reflectors **17***a*-**17***c*, the low-beam diffusing reflector **17***a* is located vehicle-innermost. The first low-beam condensing reflector **17***b* is located on the vehicle outside of the low-beam diffusing reflector **17***a*. The second low-beam condensing reflector **17***c* is located on the vehicle outside of the first low-beam condensing reflector **17***b*.

The low-beam diffusing reflector **17***a*, the first low-beam condensing reflector **17***b*, and the second low-beam condensing reflector **17***c* have respective reflection surfaces **20***a* to **20***c* each of which is formed with a paraboloid of revolution as a reference. The fourth LED **18***d* is disposed at a focal position of the reflection surface **20***a* of the low-beam diffusing reflector **17***a*. The fifth LED **18***e* is disposed at a focal position of the reflection surface **20***b* of the first low-beam condensing reflector **17***b*. The sixth LED **18***f* is disposed at a focal position of the reflection surface **20***c* of the second low-beam condensing reflector **17***c*.

In the first embodiment, the high-beam reflector unit **16** and the first to third LEDs **18***a* to **18***c* constitute a high-beam lamp unit for high-beam illumination. FIG. **3** shows a high-beam light distribution pattern **30** which is formed by the high-beam lamp unit. The high-beam light distribution pattern **30** shown in FIG. **3** is a light distribution pattern that is formed on a virtual vertical screen disposed at a position that is distant forward from the vehicle lamp **10** by 25 m. A vertical line V-V and a horizontal line H-H which pass though an H-V point which is a vanishing point in a lamp forward direction are shown in FIG. **3**.

A high-beam condensed light distribution pattern **31** is formed around the H-V point by (i) light that is emitted from the second LED **18***b* and reflected by the reflection surface **19***b* of the first high-beam condensing reflector **16***b* and (ii) light that is emitted from the third LED **18***c* and reflected by the reflection surface **19***c* of the second high-beam condensing reflector **16***c*. The high-beam condensed light distribution pattern **31** is a high luminous intensity region which is called a "hot zone." Also, a high-beam diffused light distribution pattern **32** is formed by light that is emitted from the first LED **18***a* and reflected by the reflection surface **19***a* of the high-beam diffusing reflector **16***a*, so as to contain the high-beam condensed light distribution pattern **31**. The high-beam diffused light distribution pattern **32** is wider than the high-beam condensed light distribution pattern **31** in both of the direction of the horizontal line H-H and the direction of the vertical line V-V The high-beam condensed light distribution pattern **31** may be a region of about ±10° to 15° in the direction of the horizontal line H-H and about ±3° to 5° in the direction of the vertical line V-V. The high-beam diffused light distribution pattern **32** may be a region of about ±25° to 35° in the direction of the horizontal line H-H and about ±8° to 10° in the direction of the vertical line V-V The high-beam condensed light distribution pattern **31** and the high-beam diffused light distribution pattern **32** are superimposed on each other to form the high-beam light distribution pattern **30**.

In the first exemplary embodiment, the low-beam reflector unit **17** and the fourth to sixth LEDs **18***d* to **18***f* constitute a low-beam lamp unit for low-beam illumination. FIG. **4** shows a low-beam light distribution pattern **40** which is formed by the low-beam lamp unit. The low-beam light distribution pattern **40** shown in FIG. **4** is a light distribution pattern which has a cutoff line having a predetermined shape.

A low-beam condensed light distribution pattern **41** is formed around the H-V point by (i) light that is emitted from the fifth LED **18***e* and reflected by the reflection surface **20***b* of the first low-beam condensing reflector **17***b* and (ii) light that is emitted from the six LED **18***f* and reflected by the reflection surface **20***c* of the second low-beam condensing reflector **17***c*. The low-beam condensed light distribution pattern **41** is a high luminous intensity region called a "hot zone" and has the cutoff line having the predetermined shape. Also, a low-beam diffused light distribution pattern **42** is formed by light that is emitted from the fourth LED **18***d* and reflected by the reflection surface **20***a* of the low-beam diffusing reflector **17***a*, so as to contain the low-beam condensed light distribution pattern **41**. The low-beam diffused light distribution pattern **42** is wider than the low-

beam condensed light distribution pattern **41** in both of the direction of the horizontal line H-H and the direction of the vertical line V-V. The low-beam condensed light distribution pattern **41** may be a region of about ±10° to 15° in the direction of the horizontal line H-H and about 0° to −5° in the direction of the vertical line V-V. The low-beam diffused light distribution pattern **42** may be a region of about ±25° to 45° in the direction of the horizontal line H-H and about 0° to −10° in the direction of the vertical line V-V. The low-beam condensed light distribution pattern **41** and the low-beam diffused light distribution pattern **42** are superimposed on each other to form the low-beam light distribution pattern **40**.

As described above, the high-beam diffusing reflector **16***a* is located on the vehicle inside of the first high-beam condensing reflector **16***b* and the second high-beam condensing reflector **16***c* (in FIG. **1**, on the right side of the first high-beam condensing reflector **16***b* and the second high-beam condensing reflector **16***c*). In the first embodiment, the outer cover **13** is inclined rearward from the vehicle inside toward the vehicle outside. Therefore, a front portion **21** (hatched in FIG. **1**) of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of front end portions of the first and second high-beam condensing reflectors **16***b*, **16***c*.

FIG. **1** shows light beams L**1** and L**2** reflected by the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a*. In the first embodiment, the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of the front end portions of the high-beam condensing reflectors **16***b* and **16***c*. Therefore, the light beams L**1** and L**2** reflected by the front portion **21** are not shielded by the high-beam condensing reflector **16***b* or **16***c*. That is, since the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of the front end portions of the high-beam condensing reflectors **16***b* and **16***c*, diffusion light paths of the light beams L**1** and L**2** are secured and the visibility of the side portions of the illumination area ahead of the vehicle can thereby enhanced.

In the first embodiment, the low-beam reflector unit **17** is configured similarly to the high-beam reflector unit **16**. That is, the low-beam diffusing reflector **17***a* of the low-beam reflector unit **17** is located on the vehicle inside of the first low-beam condensing reflector **17***b* and the second low-beam condensing reflector **17***c* (in FIG. **1**, on the right side of the first low-beam condensing reflector **17***b* and the second low-beam condensing reflector **17***c*). Therefore, a front portion **22** (hatched in FIG. **1**) of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is located in front of the front end portions of the first and second low-beam condensing reflectors **17***b*, **17***c*.

FIG. **1** shows light beams L**3** and L**4** reflected by the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a*. In the first embodiment, the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is located in front of the front end portions of the low-beam condensing reflectors **17***b* and **17***c*. Therefore, the light beams L**3** and L**4** reflected by the front portion **22** are not shielded by the low-beam condensing reflector **17***b* or **17***c*. That is, since the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is located in front of the front end portions of the low-beam condensing reflectors **17***b* and **17***c*, diffusion light paths of the light beams L**3** and L**4** are secured, which also contributes to the enhancement of the visibility of the side portions of the illumination area ahead of the vehicle.

In the first embodiment, the front portion of the reflection surface of the diffusing reflector is located in front of the front end portions of the condensing reflectors. However, the visibility of the side portions of the illumination area ahead can be enhanced so long as at least a part of the reflection surface of the diffusing reflector is located in front of the front end portions of the condensing reflectors.

FIG. **5** is a schematic horizontal section view of a vehicle lamp **50** according to a second embodiment of the invention. Elements of the vehicle lamp **50** shown in FIG. **5** which are the same as or correspond to those in the vehicle lamp **10** shown in FIG. **1** are given the same reference symbols and may not be described redundantly.

The vehicle lamp **50** according to the second embodiment is different from the vehicle lamp **10** shown in FIG. **1** in the structures of the high-beam reflector unit **16** and the low-beam reflector unit **17**.

The high-beam reflector unit **16** is disposed on the vehicle inside of the low-beam reflector unit **17** (in FIG. **5**, on the right side of the low-beam reflector unit **17**) and include a high-beam diffusing reflector **16***a*, a first high-beam condensing reflector **16***b*, and a second high-beam condensing reflector **16***c*. The three reflectors **16***a* to **16***c* are integrated together.

In the second embodiment, the first high-beam condensing reflector **16***b* is located vehicle-innermost. The high-beam diffusing reflector **16***a* is located on the vehicle outside of the first high-beam condensing reflector **16***b*. The second high-beam condensing reflector **16***c* is located on the vehicle outside of the high-beam diffusing reflector **16***a*. That is, the high-beam diffusing reflector **16***a* is located between the first high-beam condensing reflector **16***b* and the second high-beam condensing reflector **16***c*.

Where the high-beam diffusing reflector **16***a* is located on the vehicle outside of the first high-beam condensing reflector **16***b* as described above, the high-beam diffusing reflector **16***a* as a whole is located in rear of the first high-beam condensing reflector **16***b* due to the arrangement space (i.e., the outer cover **13** is inclined rearward from the vehicle inside toward the vehicle outside). In this case, if an ordinary design were to be employed, light beams that travel toward side portions of an illumination area ahead of the vehicle from the reflection surface **19***a* of the high-beam diffusing reflector **16***a* might be shielded by the first high-beam condensing reflector **16***b*. In view of this, in the second embodiment, the F value (focal length) of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is set to be smaller than that of the first reflection surface **19***b* of the first high-beam condensing reflector **16***b* so that a front portion **21** (hatched in FIG. **5**) of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of the front end portion of the first high-beam condensing reflector **16***b*.

FIG. **5** shows light beams L**1** and L**2** reflected by the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a*. In the second embodiment, the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of the front end portions of the high-beam condensing reflectors **16***b* and **16***c*. Therefore, the light beams L**1** and L**2** reflected by the front portion **21** are not shielded by the high-beam condensing reflector **16***b* or **16***c*. Accordingly, diffusion light paths of the light beams L**1** and L**2** are secured, and the visibility of the side portions of the illumination area ahead of the vehicle can thereby enhanced.

The low-beam reflector unit **17** is configured similarly to the high-beam reflector unit **16**. That is, the low-beam

reflector unit **17** is located on the vehicle outside of the high-beam reflector unit **16** and includes three parabolic reflectors, that is, a low-beam diffusing reflector **17***a*, a first low-beam condensing reflector **17***b*, and a second low-beam condensing reflector **17***c*. The three reflectors **17***a* to **17***c* are integrated together.

In the second embodiment, the first low-beam condensing reflector **17***b* is located vehicle-innermost. The low-beam diffusing reflector **17***a* is located on the vehicle outside of the first low-beam condensing reflector **17***b*. The second low-beam condensing reflector **17***c* is located on the vehicle outside of the low-beam diffusing reflector **17***a*. That is, the low-beam diffusing reflector **17***a* is located between the first low-beam condensing reflector **17***b* and the second low-beam condensing reflector **17***c*.

In the second embodiment, the F value (focal length) of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is set to be smaller than that of the reflection surface **20***b* of the first low-beam condensing reflector **17***b* so that a front portion **22** (hatched in FIG. **5**) of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is located in front of the front end portion of the first low-beam condensing reflector **17***b*.

FIG. **5** shows light beams L**3** and L**4** reflected by the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a*. In the second embodiment, the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is located in front of the front end portions of the low-beam condensing reflectors **17***b* and **17***c*. Therefore, the light beams L**3** and L**4** reflected by the front portion **22** are not shielded by the low-beam condensing reflector **17***b* or **17***c*. Accordingly, diffusion light paths of the light beams L**3** and L**4** are secured, which also contributes to the enhancement of the visibility of the side portions of the illumination area ahead of the vehicle.

FIG. **6** is a schematic horizontal section view of a vehicle lamp **60** according to a third embodiment of the invention. Elements of the vehicle lamp **60** shown in FIG. **6** which are the same as or correspond to those in the vehicle lamp **10** shown in FIG. **1** are given the same reference symbols and may not be described redundantly.

In the vehicle lamp **60** according to the third embodiment, a high-beam diffusing reflector **16***a*, a condensing reflector unit **61**, and a low-beam diffusing reflector **17***a* are provided in the lamp chamber **14**.

The condensing reflector unit **61** is configured so that first and second high-beam condensing reflectors **16***b*, **16***c* for a high-beam condensed light distribution pattern and first and second low-beam condensing reflectors **17***b*, **17***c* for a low-beam condensed light distribution pattern are integrated together. Among the four reflectors **16***b*, **16***c*, **17***b*, and **17***d*, the first high-beam condensing reflector **16***b* is located vehicle-innermost. The second high-beam condensing reflector **16***c* is located on the vehicle outside of the first high-beam condensing reflector **16***b*. The first low-beam condensing reflector **17***b* is located on the vehicle outside of the second high-beam condensing reflector **16***c*. The second low-beam condensing reflector **17***c* is located on the vehicle outside of the first low-beam condensing reflector **17***b*.

The high-beam diffusing reflector **16***a* which is closest to the front-rear center line of the vehicle is the same as the one shown in FIG. **1**. The high-beam diffusing reflector **16***a* is located on the vehicle inside the condensing reflector unit **61**. Also in this embodiment, since the outer cover **13** is inclined rearward from the vehicle inside towards the vehicle outside, a front portion **21** (hatched in FIG. **6**) of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of the front end portions of the condensing reflector unit **61**.

FIG. **6** shows light beams L**1** and L**2** reflected by the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a*. In this embodiment, since the front portion **21** of the reflection surface **19***a* of the high-beam diffusing reflector **16***a* is located in front of the front end portions of the condensing reflector unit **61**, the light beams L**1** and L**2** reflected by the front portion **21** are not shielded by the high-beam condensing reflector **16***b* or **16***c*. Therefore, diffusion light paths of the light beams L**1** and L**2** are secured and the visibility of side portions of an illumination area ahead can thereby increased.

The low-beam diffusing reflector **17***a* which is most distant from the front-rear center line of the vehicle is the same as the one shown in FIG. **5**. In this embodiment, the low-beam diffusing reflector **17***a* is located on the vehicle outside of the condensing reflector unit **61**. However, in this embodiment, the F value of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is set smaller than that of the reflection surface **20***c* of the adjacent second low-beam condensing reflector **17***c*, so that a front portion **22** (hatched in FIG. **6**) of the reflection surface **20***a* of the low-beam diffusing reflector **16***a* is located in front of the front end portion of the second low-beam condensing reflector **17***c*.

FIG. **6** shows light beams L**3** and L**4** reflected by the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a*. In the third embodiment, the front portion **22** of the reflection surface **20***a* of the low-beam diffusing reflector **17***a* is located in front of the front end portion of the adjacent low-beam condensing reflector **17***c*. Therefore, the light beams L**3** and L**4** reflected by the front portion **22** are not shielded by the adjacent low-beam condensing reflector **17***c*. Accordingly, diffusion light paths of the light beams L**3** and L**4** are secured, which also contributes to the enhancement of the visibility of the side portions of the illumination area ahead of the vehicle.

Furthermore, in the third embodiment, the first high-beam condensing reflector **16***b*, the second high-beam condensing reflector **16***c*, the first low-beam condensing reflector **17***b*, and the second low-beam condensing reflector **17***c* are integrated together as mentioned above.

In vehicle lamps in which plural parabolic reflectors are used and in which a high-beam condensing reflector(s) and a low-beam condensing reflector(s) are configured as separate elements as in the first embodiment shown in FIG. **1**, if the high-beam condensing reflector(s) and the low-beam condensing reflector(s) are mounted at positions which are deviated from the design positions, the intended positional relationship between a high-beam condensed light distribution pattern and a low-beam condensed light distribution pattern would be lost. For example, if adjustments are made so as to form a low-beam condensed light distribution pattern that is located at the ideal position (i.e., located around the H-V point), a high-beam condensed light distribution pattern may deviate from around the H-V point to lower the long-distance visibility at the time of high-beam illumination. In the third embodiment, the high-beam LEDs **18***b* and **18***c* and the low-beam LEDs **18***d* and **18***e* are mounted on the single, common board **15**. Therefore, it may be difficult to control the positions of a high-beam condensed light distribution pattern and a low-beam condensed light distribution pattern to be located in the ideal positions by adjusting the postures of the high-beam condensing reflectors **16***b* and **16***c* and the low-beam condensing reflectors **17***b* and **17***c*.

In view of the above, in the third embodiment, the high-beam condensing reflectors **16***b* and **16***c* and the low-beam condensing reflectors **17***b* and **17***c* are integrated together. With this structure, the positional deviations between the high-beam condensing reflectors **16***b*, **16***c* and the low-beam condensing reflectors **17***b*, **17***c* can be suppressed. Thereby, it can be prevented that the positions of a high-beam condensed light distribution pattern and a low-beam condensed light distribution pattern deviate from the ideal positions. As a result, the vehicle lamp **60** is given high long-distance visibility.

The invention has been described with reference to the exemplary embodiments. It should be noted the exemplary embodiments are just examples. One skilled in the art would appreciate that the respective elements and a combination(s) of the elements can be modified in various ways and that the scope of the invention should encompass such modifications.

For example, in the above described exemplary embodiments, LEDs are employed as light sources. However, the light sources are not limited to LEDs but may be semiconductor lasers, light bulbs, or the like.

What is claimed is:

1. A vehicle lamp comprising:

a first parabolic condensing reflector that forms a condensed light distribution pattern by reflecting light emitted from a first light source; and

a parabolic diffusing reflector that forms a diffused light distribution pattern by reflecting light emitted from a second light source, wherein

at least a part of a reflection surface of the diffusing reflector is located in front of a front end portion of the first parabolic condensing reflector,

the condensing reflector and the diffusing reflector are integrated with each other and arranged in a lateral row extending from a vehicle inside to a vehicle outside or vice versa, and

the first light source and the second light source are mounted on a common board that extends in a horizontal direction and are supplied with currents from said common board, wherein

the first light source and the second light source are mounted on said common board with their light emitting surfaces down, and

the condensing reflector and the diffusing reflector are disposed below said common board.

2. The vehicle lamp according to claim **1**, wherein the diffusing reflector is located on the vehicle inside of the first parabolic condensing reflector.

3. The vehicle lamp according to claim **1**, wherein a focal length (F) of the reflection surface of the diffusing reflector is smaller than that of a reflection surface of the first parabolic condensing reflector.

4. The vehicle lamp according to claim **1**, further comprising:

a second parabolic condensing reflector that forms a low-beam condensed light distribution pattern, wherein

the condensed light distribution pattern formed by the first parabolic condensing reflector is a high-beam condensed light distribution pattern, and

the first parabolic condensing reflector and the second parabolic condensing reflector are integrated together.

5. The vehicle lamp according to claim **1**, further comprising:

a second parabolic condensing reflector that forms a condensed light distribution pattern by reflecting light emitted from a third light source, wherein

the diffusing reflector is integrated with and disposed between the first and second condensing reflectors in the row, with the at least part of the reflection surface of the diffusing reflector also being located in front of a front end portion of the second parabolic condensing reflector.

6. The vehicle lamp according to claim **1**, wherein the high-beam light distribution pattern is formed by the superimposition of a high-beam condensed light distribution pattern and a high-beam diffused light distribution pattern.

7. The vehicle lamp according to claim **1**, wherein the low-beam light distribution pattern is formed by the superimposition of a low-beam condensed light distribution pattern and a low-beam diffused light distribution pattern.

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